

APPENDIX B

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Appendix B

Material

B1. OVERVIEW

As part of the System Safety Process, GSFC Materials Engineers review all materials used in HH payloads for freedom from stress corrosion cracking and to determine their potential flammability, toxicity, and offgassing¹ characteristics. Materials are also reviewed to determine their outgassing² and contamination characteristics so that scientific data degradation is minimized. (Note: A good rule to follow in meeting materials requirements is to house hardware in sealed containers).

B2. MATERIALS REVIEW PROCESS

- a. Complete the appropriate forms applicable to your payload at a relevant point in the design process.
- b. Submit completed forms to the HH Project Office, which will forward them to the HH Materials Engineer for review.
- c. If any questions arise during the Materials Engineer's review, you will be contacted by telephone.
- d. The Materials Engineer will document his findings at the completion of his review and forward them to you through the HH Project Office.

(Note: Some findings may require the submission of a material sample for test by GSFC or recommend an alternate material for one that is unacceptable for use.)

1. Offgassing - The emanation of volatile matter of any kind from materials into a manned pressurized volume.
2. Outgassing - The emanation of volatile materials under vacuum conditions resulting in a mass loss and/or material condensation on nearby surfaces.

B3. LIST OF CANDIDATE MATERIALS

For the immediate needs of the HH and SPOC, we have generated lists of materials which, if used prudently, can form the basis of an acceptable materials design. It should be noted that while the materials listed are considered "acceptable" for space use, successful performance is not ensured without having an appropriate technical merit review by materials engineers. Nor does it assure that the selected material will not be used improperly.

This selection was based on certain criteria for polymers and metals in light of the referenced documents. Limitations regarding outgassing of polymers and the stress corrosion cracking of metals are of major concern to Shuttle payloads. In addition, test results such as flammability

may not be readily available in the manufacturers' literature and may require further testing at JSC.

It is required that the selection of materials used in the design of payload structures, support brackets, and mounting hardware complies with the stress corrosion cracking criteria of the latest version of MSFC-SPEC-522. Acceptable materials taken from MSFC-SPEC-522B are given in Table B.1. Other materials need to have a Materials Usage Agreement (MUA) submitted for approval.

Refer to NASA Ref. Pub. 1124, August 1987, for lists of materials which have been tested for outgassing and have met the acceptable criteria. This criteria is that a maximum 1% Total Mass Loss (TML) and a maximum of 0.10% Collected Volatile Condensable Materials (CVCM) is acceptable. For materials that are not included, the Materials Branch of the GSFC, Code 313 should be contacted to determine their outgassing values.

Wherever more stringent outgassing criteria are needed, such as near sensitive optics, the CVCM value of 0.01% should be used. A list of these materials is included in Table B.2. Most of these materials will cure at room temperature and those that require an elevated temperature cure are indicated by an asterisk (*). In addition, those materials considered to be "non-flammable" per JSC/White Sands Test Facility (WSTF) data are indicated by a (1).

In using materials for space flight applications, several general precautions should be considered:

- a. The use of electroless nickel on flexible members is not recommended due to its brittle nature.
- b. Metal platings used as a corrosion protection film, should be at least 200 x 10⁻⁶ inches thick.
- c. When the recommended Brayco oil and greases are used, a barrier film should be properly applied for prevention of lubricant creep.
- d. The use of Ray Chem Spec 44/ or 55 wire is not prohibited, although it is classed as flammable. It is highly recommended that Teflon TFE (MIL-W-22759/11-12) or Kapton polyimide (MIL-W-81381/9-12) be used throughout the Program. Neither are flammable.
- e. When using dry solid film lubricants and metal platings, allowance must be made for the lubricant thickness. Sputtered MoS₂ does not change the dimension to any significant degree.
- f. Formulate plans for controlling the particulate and Non-Volatile Residue (NVR) contaminants around optics.
- g. Use care in mixing and curing polymeric materials.
- h. Use proper identified and dated (shelf life) materials at all times.
- i. Use the proper primer with paints, conformal coatings, and potting compounds.
- j. Flammability data is available on a limited number of materials as shown in Table B.2.

As a final note, these attached lists should be considered as a starting point and do not negate the use of other materials. It is not the intent of these lists to limit the use of materials to a select group but rather to assist the customer by listing those which have been used in previous space projects. Selected materials should be submitted for approval through the project office on forms shown in Figures B-1 through B-6.

TABLE B.1 MATERIALS LIST ENCLOSURE MSFC-SPEC-522B ATTACHMENT A
Alloys With High Resistance To Stress Corrosion Cracking

<u>STEEL ALLOYS</u>	<u>Condition</u>
<u>Alloy</u>	
Carbon Steel (1000 Series)	Below 180 ksi UTS
Low Alloy Steel (4130, 4340, D6AC, etc.)	Below 180 ksi UTS
Music Wire (ASTM 228)	Cold Drawn
1095 Spring Steel	Tempered
HY 80 Steel	Tempered
HY 130 Steel	Tempered
HY 140 Steel	Tempered
ASP 11	Aged
200 Series Stainless Steel (Unsensitized) (1)	All
300 Series Stainless Steel (Unsensitized) (1)	All
400 Series Ferritic Stainless Steel (404, 430, 444, etc.)	All
Nitronic 32 (2)	Annealed
Nitronic 300 (2)	Annealed
Nitronic 40 (formerly 21-6-9) (2)	Annealed
A-286 Stainless Steel	All
AM-350 Stainless Steel	SCT 1000 and Above
AM-355 Stainless Steel	SCT 1000 and Above
AM-362 (Almar 362) Stainless Steel	3 Hrs. at 1000°F
Carpenter 20Cb Stainless Steel	All
Carpenter 20Cb-3 Stainless Steel	All
Custom 450 Stainless Steel	H1000 and Above
Custom 455 Stainless Steel	H1000 and Above
15-5PH Stainless Steel	H1000 and Above
PH15-7Mo Stainless Steel	CH900
17-7PH Stainless Steel	CH900

(1) Including weldments of 304L, 316L, 321, and 347

(2) Including weldments.

<u>WROUGHT</u>	<u>ALUMINUM ALLOYS</u>	<u>CAST</u>
<u>ALLOY (1)</u>	<u>TEMPER (2)</u>	<u>ALLOY (3)</u>
1000 Series	All	319.0, A319.0
2011	T8	333.0, A333.0
2024 Rod, Bar	T8	355.0, C355.0
2219	T6, T8	356.0, A356.0
2618	T6	357.0
3000 Series	All	B358.0 (Tens-50)
5000 Series	All (4), (5)	359.0
6000 Series	All	380.0, A380.00
7049	T73	514.0, (214)
7149	T73	518.0, (218)
7050	T73	535.0 (Almag 35)
7075	T73	A712.0, C712.0
7475	T73	As Cast (5)

(1) Including weldments of the weldable alloys.

(2) Including mechanically stress relieved (TX5X or TX5XX) tempers when applicable.

(3) The former designation is shown in parenthesis where significantly different.

TABLE B.1 (CONT'D)

- (4) High magnesium alloys 5456, 5083, and 5086 should be used in controlled tempers (H111, H112, H116, H117, H323, H343) for resistance to SCC and exfoliation.
- (5) Alloys with magnesium content greater than 3.0 percent are not recommended for high temperature application, 660°C (1500°F) and above.

Condition

CDA No. (1)	(% Cold Rolled) (2)
110	37
170	AT, HT (3)
172	AT, HT (3)
194	37
195	90
230	40
422	37
443	10
510	37
521	37
524	0
606	0
619	40 (9% B phase)
619	40 (95% B phase)
638	0
655	0
688	40
704	0
706	50
710	0
715	0
725	40
752	50

(1) Copper Development Association alloy number.
 (2) Maximum percent cold rolled for which SCC data is available.

(3) AT - Annealed and precipitation hardened.

HT - Work hardened and precipitation hardened.

TABLE B.1 (CONT'D)
NICKEL ALLOYS

<u>Alloy</u>	<u>Condition</u>
Glass Seal 52 CR (51Ni-49Fe)	All
Invar 36 (36Ni-64Fe)	All
Hastelloy B	Solution Heat Treated
Hastelloy C	All
Hastelloy X	All
Incoloy 800	All
Incoloy 825	All
Incoloy 901	All
Incoloy 903	All
Inconel 600 (1)	Annealed
Inconel 625	Annealed
Inconel 718 (1)	All
Inconel X-750	All
Monel K-500	All
Ni-Span-C 902	All
Rene ¹ 41	All
Unitemp 212	All
Waspaloy	All

MISCELLANEOUS ALLOYS

<u>Alloy</u>	<u>Condition</u>
Beryllium S-200C	Annealed
HS 25 (L605)	All
HS 188 (1)	All
MP 35N	Cold Worked and Aged
MP159 Cold	Worked and Aged
Titanium 3A1-2.5V	All
Titanium 5A1-2.5SN	All
Titanium 6A1-4V	All
Titanium 10Fe-2V-3A1	All
Titanium 13V-11Cr-3A1	All
Titanium IMI 550	All
Magnesium M1A	All
Magnesium LA141	Stabilized
Magnesium LAZ933	All

(1) Including weldments

TABLE B.2 MATERIALS WITH LOW OUTGASSING AND FLAMMABILITY DATA AVAILABLE

MATERIALS WITH LOW OUTGASSING AND FLAMMABILITY DATA AVAILABLE

ADHESIVES, CONFORMAL COATINGS (C.C.) AND POTTING COMPOUNDS

Armstrong A-12; 3A/2B	epoxy(1)	adhesive
Armstrong A-31; 6A/4B	epoxy(1)	adhesive
Epon 828/TETA; 10A/1B	epoxy(1)	adhesive, C.C.
Epon 828/Versamid 140; 70A/30B	epoxy(1)	adhesive, C.C.
Hysol 11C; 1A/1B	epoxy	adhesive
Crest 3135/7111; 1A/1B	epoxy	adhesive
Stycast 2850/Cat. 9; 10A/0.3B	epoxy	adhesive
Stycast 2057/Cat. 9; 100A/6B	epoxy	potting
Stycast 2651MM/Cat. 9; 100A/6.5B	epoxy	adhesive, potting
Hysol C2-4259/3401	epoxy	potting
Conathane EN21; 100A116B	polyurethane	adhesive, C.C., potting
Uralane 5753LV; 1A/5B	polyurethane	C.C., potting
Solithane 113/300 Formula #4 or #21	polyurethane	C.C., potting
P.R. 1660L; 25A/100B/8 Cab-O-Sil	polyurethane	adhesive, potting
DC93500; 10A/18	silicone	adhesive, potting, C.C.
RTV 566; 0.1% Cat.	silicone	adhesive, potting, C.C.
RTV 567; 0.5% Cat.	silicone	adhesive, potting, C.C.
RTV 142	silicone	adhesive

WIRE AND CABLE WITH TEFLON

(MIL-W-22759/11; MIL-W-22759/12) or Kapton polyimide
MIL-W-81381/9-12 (1)

SHRINK TUBING

Chemfluor Teflon*	(1)
ThermoFit 400 Teflon*	(1)
ThermoFit TR218 Kynor/Viton*	(1)
ThermoFit TFE-R Teflon*	(1)

ELECTRICAL CONNECTORS/FEEDTHROUGHS

AMP-Feedthrough term block 204307-6-70-39	epoxy
Appleton Connector Red/Black Phenolic/Fiberglas	
Bendix Connector PT07H-14-19P Green	
Cannon Connector MS3476 Black Phenolic	
Cannon Connector C-16 MS C-40M 39569	silicone
Cannon Connector PV6G24831/SWC16 Red	silicone
DAP Connector Insert DDM 24W7P	
Deutsch Connector 6825 RM04-4428	silicone

ELECTRICAL SHIELDS

Eccosorb MF112 Fe filled epoxy
Eccosorb MF113 Fe filled epoxy
Cho-Seal 1217 Ag filled fluorosilicon 125*
Cho-Seal 1221 Ag filled silicone aerospace 200*

FILM AND SHEET MATERIALS

Cellulose acetate butyrate 200 micron purple film
Cronar polyester transparency film
Genotherm HT unplasticized PVC clear film
Mylar LA616 film
Kapton H-film (1)
Polychrome 8 mil film
Tedlar 150-30 CC black film
Ormalon TG 4030 neutral Teflon or glass cloth-heat barrier film
Beta Marquisette woven fiberglass, Style 2530
Fairprene VS0080 black Viton A sheet (1)
Fluoroglas 389-7 beta cloth/PTFE coated (1)
Cho-Therm 1677 white fluorosilicone-thermal control
Dacron mesh E2A polyesternetting - thermal blanket
Dacron mesh 15320 polyester netting - thermal blanket
G401500 Ag/Teflon film (1)

FOAMS

P-65 polyether urethane foam white methyl alcohol wash
Absafil F1200/20 glass fibers
Skybond R1 7271-12 or 18 rigid polyimide
Zerefil F700 vinyl/20 glass fibers
Scott polyester urethane 100 TPI methyl alcohol wash*

LUBRICANTS

Brayco 815Z oil (1)
Brayco 601, 602, and 603; RP, MS and Zn grease (1)
Apiezon L and N; grease
Rulon A,B,C,J,LD and 123; Teflon/fiberglass solid
MoS2 -filled vespel grade, SP3

THERMAL INTERFACE CONTROL MATERIALS

Eccobond 57C; 1A/1B, Ag filled epoxy adhesive
Hysol K-16; 3A/1B, epoxy adhesive
Cho-Therm 1677 white fluorosilicon* (1)
Cho-Therm 1671 white silicone*
G-9042 white silicone thermal grease (1) (2)
G9052 black silicone (2)
BrayCo 3L-38-Zn fluorocarbon grease (1) (2)
McGhan NVSIL 2946, two part silicone

McGhan NVSIL CV2942
Eccosil 4954

FACING TAPE AND CABLE TIES

Stur-D-Lace 18DH - scoured	
Temp Lace 230 Teflon	(1)
Ty-Rap Ty25M Tefzel	(1)
Ty-Rap Ty307 Teflon	
Velcro midtemp Nomex polyimide fastener	
TABLE B.2 (Cont'd)	
CIRCUIT BOARDS	
Nema G-10 Mica/Cell55 (RCA)	
Micaply PG 418T polyimide fiberglass (MCA)	(1)
602 Teflon/fiberglass (ATL)	(1)
Duroid 5870 Teflon/fiberglass (ROG)	(1)
Duroid 5880 Teflon/fiberglass (ROG)	(1)
Multilayer board - MIL-P-55617, 55636, 13949	

LAMINATES

*Hercules 2002 M graphite fiber reinforced polymers, GFRP	
*Gy70/X-30 GFRP	(1)
*Gy 70/5208 or Gy70/5209 GFRP	(1)
Hexcel-F174-120 glass cloth/polyimide prepreg.	
KG098 Teflon/fiberglass (MMM)	
Narmco 8517 epoxy/glass	
T300/934 GFRP	(1)

LABELS AND MARKING INKS

Scotchcal 8001 and 8009 - aluminum labels (3M)
Scotchcal 8005 photosensitive film (3M)
Wornow Cat-L-Ink 50-100/Cat. 9/50-900 white

MOLDING COMPOUNDS

Acrylafil G47/20 styrene/acrylonitrile/fiberglass	
AF 1006 acryl butadiene styrene	
CF 1006 styrene/fiberglass	
Dapon M - C2580-11B FR-FMC	
DF 1006-polycarbonate/fiberglass	
GF 1006-polysulfone/fiberglass	
JF 1006-polyethersulfone/fiberglass	
Lexan 500-polycarbonate	
Noryl EN26	
Stycast 0005 polystyrene	(1)
Teflon PFA-TE 9704	(1)
Tefzel	(1)
Vespel SP-5 polyimide/glass fiber	(1)

PAINTS

Chemglaze Z306 black	(1)
GSFC - 01550 white resin/ZRO	
RTV 602 Dev. 764-1A white (GSFC)	(1)

RUBBERS/ELASTOMERS

ECD 006 and 487-90 perfluoroelastomer	(1)
Fluron FS005 Viton red	(1)
Gor-Tex carbon doped expanded Teflon	(1)
Kalrez 1050 or 3018 perfluoroelastomer	(1)
Mosites 1059 Fluorel fluoracarbon	(1)
Parker O-Ring S-383-70 red silicone	
Parker O-Ring V-747-75 Viton E6G	(1)
Viton B	

TAPES

3M 415 Scotchpar - 2 sided	
3M X-1255 Kapton - 2 sided*	
3M Y-9460 Kapton transfer	
3M Y-967 Kapton transfer	
G400201 A1/Teflon	(1)
G406400 A Kapton	(1)
3M Y9339 A1 fil	(1)
3M 420 Lead foil	(1)
3M 425 Al foil	(1)
3M 5 polyester	
Mystik 7375 Tedlar	(1)
Mystik 7420 Copper foil	(1)
Temp-R-Tape Kapton	(1)

NOTE: (1) - Considered non-flammable per JSC/WSTC data.

* - Other than Room Temperature (RT) cure.

(2) - Migrates when heated sufficiently.

NONMETALLIC MATERIALS IDENTIFICATION AND USAGE LIST											
PAGE _____		ELEMENT LOCATION		GSFC MATLS EVALUATOR		DATE RECEIVED _____		GSFC EVALUATION			
CONTRACT NO _____		CONTRACTOR		PREPARED BY _____		PHONE _____		PHONE _____		A NA SA	
HARDWARE ELEMENT _____		PRESSURE _____		MEDIA _____		TEMP RANGE _____		PHONE _____		DATE EVALUATED _____	
NONMETALLIC MATERIAL IDENTIFICATION											
PART DWG NUMBER	MATERIAL	DESCRIPTION SPEC	MFGR	AREA (mm ²)	WT (KG)	THK (mm)	FLAMMABILITY	ODOR	TOXICITY	TVS	RATING SOURCE
PROCEDURE FOR COMPLETING NONMETALLIC MATERIAL IDENTIFICATION AND USAGE LIST											
<p>All nonmetallic materials listed on drawings or parts lists must be entered on this list.</p> <p>Hardware Element – Enter name of element for which sheet applies. Example: Motor, signal generator, control panel, harness.</p> <p>Hardware Element Location – Check location for hardware element, either Orbiter Cargo Bay, SpaceLab Habitable Area, Orbiter Cabin, or Airlock.</p> <p>Pressure – Enter pressure of hardware element when in operation (i.e., 14.5 psia, vacuum). If element is pressurized to higher pressure, enter maximum pressure of element.</p> <p>Media – Enter media of hardware element: Air, oxygen, nitrogen, vacuum, etc.</p> <p>Temperature Range – Enter operating temperature range for element.</p> <p>Part No Drawing – Enter part number/drawing number which calls out material, including materials listed on parts list.</p> <p>Material Nomenclature – Enter trade name of material. Example: RTV 732</p> <p>Description Specification – Enter material description specification number. Example: Silicone, MIL-A-46148</p> <p>MFGR – Enter manufacturer of material. Example: Dow Corning Corporation.</p> <p>Area – Enter exposed surface area of material in square millimeters.</p> <p>Weight – Enter weight of material.</p> <p>Thickness – Enter thickness of material.</p> <p>Material Ratings – Enter information as found in Government reference and other documents.</p> <p>Rating source – Enter source of rating. Example: RTV-732-MSFC-HB81K-527, odor data from JSC 02681.</p> <p>Usage Application – Enter brief description of usage application. Example: RTV-732 – used to bond silicone rubber.</p> <p>GSFC Evaluator's Comments: A = approved, NA = not approved; SA = see attached document for further comments.</p>											

FIGURE B.1 NON-METALLIC MATERIALS IDENTIFICATION AND USAGE LIST

GSFC SPACECRAFT INORGANIC ⁽¹⁾ MATERIALS LIST					
SPACECRAFT	SYSTEM/EXPERIMENT	GSFC T/O			
CONTRACTOR	ADDRESS				
PREPARED BY	PHONE		DATE PREPARED		
GSFC MATERIALS EVALUATOR	PHONE		DATE RECEIVED		DATE EVALUATED
ITEM NO	MATERIAL IDENTIFICATION ⁽²⁾	CONDITION ⁽³⁾	APPLICATION ⁽⁴⁾	EXPECTED ENVIRONMENT ⁽⁵⁾	GSFC EVALUATION ⁽⁶⁾
					A NA SA
<p>NOTES</p> <p>(1) List all inorganic materials (metals, ceramics, glasses, liquids) except bearing and lubrication materials which should be listed on form GSFC 18-59C.</p> <p>(2) Give name of material, identifying number, manufacturer. E.g. Aluminum 6061-T6 Electroless nickel plate, Enplate Ni-410, Elinone, Inc.</p> <p>(3) Give details of the finished condition of the material, heat treat designation (hardness or strength), surface finish and coating, cold worked state, welding, brazing, etc. E.g. Heat treated to Rc 60 hardness, gold electroplated, brazed Surface coated with VDA and MgF₂ Cold worked to Full Hard condition and welded by TIG process, electroless nickel plate.</p> <p>(4) Give details of where on the spacecraft the material will be used (component) and its function. E.g. Electronics box structure in attitude control system, not hermetically sealed.</p> <p>(5) Give the details of the environment the material will experience as a finished S/C component, both in ground test and in space. Exclude vibration environment. List all materials with the same environment in a group. E.g. TN: -20°C/+60°C, 2 weeks, 10⁻³ torr, UV Storage: up to 1 year at RT Space: -10°C/+20°C, 2 years, 150 mi. alt., UV, electron, proton</p> <p>(6) Evaluator's comments to be filled in by GSFC evaluator. A = approved, NA = not approved, SA = see attached document for further comments.</p>					

FIGURE B.2 GSFC SPACECRAFT INORGANIC MATERIALS LIST

FIGURE B.3 GSFC SPACECRAFT POLYMERIC MATERIALS LIST

GSFC SPACECRAFT LUBRICATION LIST										
SYSTEM/EXPERIMENT				GSFC T/O						
SPACECRAFT	ADDRESS									
CONTRACTOR	PHONE									
PREPARED BY	PHONE									
GSFC MATERIALS EVALUATOR	PHONE	DATE RECEIVED			DATE EVALUATED					
ITEM NO.	COMPONENT TYPE, SIZE, MATERIAL ⁽¹⁾	MANUFACTURER & M. F. R. IDENTIFICATION	PROPOSED LUBRICATION SYSTEM & AMT. OF LUBRICANT	TYPE & NO. OF WEAR CYCLES ⁽²⁾	SPEED, TEMP., ATM. OF OPERATION ⁽³⁾	TYPE OF LOADS & AMT. ⁽⁴⁾	OTHER DETAILS ⁽⁵⁾	GSFC EVALUATION ⁽⁶⁾		
								A	NA	SA
NOTES										
<p>(1) BB = ball bearing, SB = sleeve bearing, G = gear, SS = sliding surfaces, SEC = sliding electrical contacts. Give generic identification of materials used for the component, e. g., 440C steel, PTFE.</p> <p>(2) CUR = continuous unidirectional rotation, CO = continuous oscillation, IR = intermittent rotation, IO = intermittent oscillation, SO = small oscillation (<30°), LO = large oscillation (>30°), CS = continuous sliding, IS = intermittent sliding. No. of wear cycles: A(1-10³), B(10²-10⁵), C(10⁴-10⁶), D(>10⁶).</p> <p>(3) Speed: RPM = revs/min., OPM = oscillations/min., VS = variable speed CPM = cm/min. (sliding applications) Temp. of operation, max. & min., °C Atmospheric, vacuum, air, gas, sealed or unsealed & pressure</p> <p>(4) Type of loads: A = axial, R = radial, T = tangential (gear load). Give amount of load.</p> <p>(5) If BB, give type and material of ball cage and number of shields and specified ball groove and ball finishes. If G, give surface treatment and hardness. If SB, give dia. of bore and width. If torque available is limited, give approx. value.</p> <p>(6) Evaluator's comments to be filled in by GSFC evaluator. A = approved, NA = not approved, SA = see attached document for further comments.</p>										

FIGURE B.4 GSFC SPACECRAFT LUBRICATION LIST

GSFC SPACECRAFT MATERIALS PROCESS LIST						
SPACECRAFT	SYSTEM/EXPERIMENT		GSFC I/O			
CONTRACTOR	ADDRESS					
PREPARED BY	PHONE		DATE PREPARED			
GSFC MATERIALS EVALUATOR	PHONE	DATE RECEIVED	DATE EVALUATED			
ITEM NO.	PROCESS TYPE ⁽¹⁾	CONTRACTOR SPEC. NO. ⁽²⁾	MIL...ASTM, FED. OR OTHER SPEC. NO.	DESCRIPTION OF MTRL. PROCESSED ⁽³⁾	SPACECRAFT/EXP. APPLICATION ⁽⁴⁾	GSFC EVALUATION ⁽⁵⁾
					A NA SA	
NOTES						
<p>1) Give generic name of process, e. g., anodizing (sulfuric acid).</p> <p>2) If process is proprietary, please state so.</p> <p>3) Identify the type and condition of the material subjected to the process. E. g., 6061-T6</p> <p>4) Identify the component or structure of which the materials are being processed. E. g., Antenna dish</p> <p>5) Evaluator's comments to be filled in by GSFC evaluator. A = approved, NA = not approved, SA = see attached document for further comments.</p>						

FIGURE B.5 GSFC SPACECRAFT MATERIALS PROCESSES LIST

MSFC-SPEC-522B
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MATERIAL USAGE AGREEMENT		C	USAGE AGREEMENT NO.:	REV.	PAGE OF
PROJECT:	SYSTEM:	SUBSYSTEM:	ORIGINATOR:	ORG./CONTRACTOR	
PART NUMBER(S)	USING ASSEMBLY(S)	ITEM DESCRIPTION		ISSUE	
MATERIAL DESIGNATION	MANUFACTURER	SPECIFICATION		PROPOSED EFFECTIVITY	
MATERIAL CODE		LOCATION	ENVIRONMENT		
THICKNESS	WEIGHT	EXPOSED AREA	HABITABLE 0	PRESSURE PSIA	TEMPERATURE of MEDIA
			NONHABITABLE 0		
APPLICATION					
RATIONALE:					
ORIGINATOR:		PROGRAM MANAGER:			DATE :
MATERIALS APPLICATIONS EVALUATION BOARD DISPOSITION					
CHIEF:	DATE	APPROVE	REJECT	DEFER	MAEB MEMO NR.
SECRETARY:					EFFECTIVITY
REMARKS:					

FIGURE B.6 MATERIAL USAGE AGREEMENT FORM